AUTOMOTIVE SEAT TRACK HAVING VERTICALLY ADJUSTABLE BEARINGS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a seat track assembly for interconnecting a seat to a floor of an automotive vehicle and, more particularly, to flat and arcuate bearing surfaces within the seat track assembly allowing torsional loading and movement of a mobile outer track relative to a fixed inner track.

2. Description of the Related Art

Automotive vehicles include seats for supporting occupants within the vehicle. Seats typically include a seat track assembly interconnecting the seat to a floor of the vehicle to allow selective locking and adjustment of the seat along the floor of the vehicle among a plurality of seating positions. A seat track assembly includes a fixed track fixedly secured to the floor of the vehicle and a mobile track slidably coupled to the fixed track and fixedly secured to the bottom of the seat.

It is known to provide a plurality of bearings between the fixed and mobile tracks to reduce friction and facilitate movement of the mobile track relative to the fixed track. An example of a seat track assembly using such a plurality of bearings is disclosed in the United States Patent 5,741,000, which issued to Goodbred on April 21, 1998.

It remains desirable to provide a seat track assembly having a plurality of bearings that allows torsional loading and movement of the mobile track relative to the fixed track while, at the same time, facilitating sliding movement of the mobile track relative to the fixed track.

SUMMARY OF THE INVENTION

According to one aspect of the invention, a seat track assembly is adapted to mount a seat to a floor of an automotive vehicle and provide selective forward and rearward adjustment of the seat relative to the floor among a plurality of seating positions. The seat track assembly includes an inner track fixedly secured to the floor of the vehicle. The inner track has a flattened bearing surface extending longitudinally along the inner track. An outer track is fixedly secured to the seat and slidably coupled to the inner track to allow selective sliding adjustment of the seat relative to the floor of the vehicle. The outer track includes an arcuate bearing surface extending longitudinally along the outer track and opposing the

flattened bearing surface. A plurality of cylindrical bearings are positioned between the flattened bearing surface of the inner track and the arcuate bearing surface of the outer track to accommodate torsional loading and movement of the outer track with respect to the inner track while facilitating the selective sliding adjustment of the seat relative to the floor.

BRIEF DESCRIPTION OF THE DRAWINGS

Advantages of the invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Figure 1 is a section view of a seat track assembly incorporating one embodiment of the invention therein; and

Figure 2 is a fragmentary side view of the seat track assembly.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Figure 1, a seat track assembly of the invention is generally shown at 10. A pair of seat track assemblies 10 (one shown) slidably interconnects a vehicle seat 12 to a floor of an automotive vehicle. The seat track assembly 10 allows selective forward and rearward adjustment of the seat 12 among a plurality of seating positions along the floor of the vehicle. The seat track assembly 10 includes a latch mechanism 16 for selectively locking the seat 12 in any one of the plurality of seating positions. An example of a latch mechanism 16 is disclosed in PCT Application US01/44685, which is hereby expressly incorporated herein by reference in its entirety.

The seat track assembly 10 includes a fixed or inner track 20. A riser 14 interconnects the inner track 20 to the floor of the vehicle. The inner track 20 has a generally U-shaped cross-section defined by generally parallel upright sides 22, 24 each having first 26, 28 and distal second 30, 32 ends. A base 33 extends laterally between the first ends 26, 28 of the sides 22, 24. An outer edge 31 extends laterally outwardly from each of the sides 22, 24. A generally flat bearing surface 37, 38 is formed in the outer edge 31 and extends longitudinally with respect to the inner track 20. An outer wall 35 extends generally perpendicularly from each of the outer edges 31 to define a flange 34, 36. A plurality of teeth 39 is formed along at least one of the outer walls 35. The plurality of teeth 39 is disposed longitudinally with respect to the inner track 20 for cooperating with the latch mechanism 16 to define the plurality of seating positions. Each bearing surface 37, 38 extends longitudinally between spaced apart tabs 41, 43.

A mobile or outer track 40 is fixedly secured to the seat and slidably coupled to the inner track 20. The outer track 40 includes generally upright sides 42, 44 each extending between a first end 46, 48 and a distal second end 50, 52. A base 54 extends laterally between the first ends 46, 48 of the sides 42, 44 of the outer track 40 to define a U-shaped cross section. Concavities 56, 58 are formed in the base 54 of the outer track 40 corresponding to the flat bearing surfaces 37, 38 of the inner track 20. Each concavity 56, 58 protrudes toward the inner track 20 to define an arcuate bearing surface 57, 59 opposing the corresponding flat bearing surfaces 37, 38. Each arcuate bearing surface 57, 59 extends longitudinally with respect to the outer track 40. Each second end 50, 52 of the upright sides 42, 44 of the outer track 40 includes a hook 60, 62 engaged with the flanges 34, 36 of the inner track 20 to prevent vertical separation of the outer track 40 from the inner track 20. A plurality of spacers 64 extends over each of the hooks 60, 62 between the inner 20 and outer 40 tracks to reduce rattle between the inner 20 and outer 40 tracks.

Referring to Figure 2, the latch mechanism 16 is operatively coupled to the outer track 40. The latch mechanism 16 includes a latch plate 74 having a plurality of apertures 79 for lockingly engaging the plurality of teeth 39. While engaged with the plurality of teeth 39, the latch plate 74 prevents sliding movement of the outer track 40 relative to the inner track 20. The latch plate 74 is movably supported on the outer track 40 for movement between a locked condition, wherein the plurality of apertures 79 is engaged with the plurality of teeth 39, and an unlocked condition, wherein the plurality of apertures 79 is disengaged with the plurality of teeth 39 to allow sliding movement of the outer track 40 relative to the inner track 20. A biasing member or spring 76 is energized between the outer track 40 and the latch plate 74 for biasing the latch plate 74 toward the locked condition. A release lever 78 is operatively coupled to the latch plate 74 for facilitating movement of the latch plate 74 between the locked and unlocked conditions.

A plurality of cylindrical bearings 80 are positioned between the flat 37, 38 and arcuate 57, 59 bearing surfaces to reduce friction between the inner 20 and outer 40 tracks. Each of the plurality of cylindrical bearings 80 is disposed laterally with respect to the flat 37, 38 and arcuate 57, 59 bearing surfaces. Engagement between each of the plurality of bearings 80 and the flat bearing surfaces 37, 38 is defined by a line of contact extending laterally with respect to the longitudinal extent of the inner 20 and outer 40 tracks. Engagement between each of the plurality of bearings 80 and the arcuate bearing surface 57, 59 is defined by a point of contact. The line and point of contact between each of the plurality of bearings 80 and the flat 37, 38 and arcuate 57, 59 bearing surfaces, respectively, allows for torsional loading or

movement of the outer track 40 with respect to the inner track 20 while still permitting and facilitating sliding movement of the outer track 40 relative to the inner track 20.

A bearing guide 88, 90 extends between each outer edge 31 of the inner track 20 and each concavity 56, 58 of the outer track 40. Each bearing guide 88, 90 includes spaced apart sides 92, 94 and a cross member 96 extending laterally between the sides 92, 94 to define a generally H-shaped cross section. Each of the plurality of bearings 80 are rotatably coupled to the sides 92, 94 of the respective bearing guide 88. Each of the sides 92, 94 includes opposite bent ends 100 and 102 adapted to engage the outer edge 31 and the concavities 56, 58 to laterally retain the plurality of bearings 80 between the flat 37, 38 and arcuate 57, 59 bearing surfaces.

In use, the latch plate 74 is moved to the unlocked condition to allow sliding movement of the outer track 40 relative to the inner track 20, and in turn, the seat relative to the floor of the vehicle among the plurality of seating positions. The plurality of bearings 80 roll between the flat 37, 38 and arcuate 57, 59 bearing surfaces to reduce friction between the outer 40 and inner 20 tracks. At the same time, the point of contact between the arcuate bearing surface 57, 59 and the plurality of bearings 80 allows the outer track 40 to roll laterally about the point of contact when the outer track 40 is torsionally loaded or moved with respect to the inner track 20 due to forces associated with, for example, the shifting weight of the occupant or the seat during lateral accelerations of the vehicle or during installation of the lower track 20 to the floor of the vehicle when the dimensions of the floor fall outside anticipated design tolerances. Additionally, the lateral line of contact between the plurality of bearings and the flat bearing surface 37, 38 laterally stabilizes the plurality of bearings 80 with respect to flat bearing surface 37, 38. When the seat is adjusted to the desired one of the plurality of seating positions, the latch plate 74 is allowed to return to the locked condition under the bias of the spring 76.

The invention has been described in an illustrative manner, and it is to be understood that the terminology, which has been used, is intended to be in the nature of words of description rather than of limitation.

Many modification and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced other than as specifically described.